AGRICULTURE MULTIBAND EXPERIMENT RADIOMETER

by

W. H. Jones (674), J. Schutt, B. Holben (623)

Agriculture Multiband Experiment Radiometer (Amber) was designed and built in 1979-80 and deployed in 1981. It consists of 15 independent radiometers, 10 with silicon detectors and 5 with lead sulfide detectors. The spectral range of the instrument is from 250 to 2500 nanometers. The 15 collimators are mounted parallel to one another and are contained in a rectangle of 5 by 18 inches. Amber is suspended from a boom which is mounted on a pick-up truck. Amber was designed to simultaneously measure sunlight reflected from vegetation in 15 optical bands. In 1982, program interest shifted from ground truth to satellite image reduction and Amber was retired. Early in 1987, the project scientists concluded that Amber, because of its 15 simple and independent optical systems, would be ideally suited to study polarized light.

The following changes were made to add polarimeter capability to the instrument:

(1) Amber was designed to down at vegetation, within 45 degrees of the vertical. The scientist required upward looking capability as well with near 4 pi steradian coverage. The boom was modified to allow greater than 3 pi steradian coverage.

(2) The 5 lead sulfide detectors were not required and were removed along with their associated thermoelectric coolers to compensate for the added weight of the boom mechanism.

(3) Five optical filters corresponding to thematic mapper channel 3 (690 nm) and five optical filters corresponding to thematic mapper channel 4 (820 nm) were installed.

(4) Mounts to hold two polarizing filters (one linear and one circular) for each channel were built, and installed with the filters.

(5) Amber has a 24 degree field-of-view. Since the polarimeter is required to look near the sun, a longer collimator was required with a narrower field-of-view. The collimators were extended three inches and the field-of-view reduced to eight degrees.

This work was completed and the instrument deployed in late August of 1987. We supported the field effort through late November. Presently we are:

(1) Designing a shutter mechanism so that the detector dark current can be measured, allowing greater accuracy at low signal levels.

(2) Selecting and installing new preamplifiers with lower offset drift to allow even lower signal levels to be detected.

This summer after the above work is complete, we plan to design an automated data collection system. This system will collect and store the data and electronically transfer data to mainframe computers at Goddard. Next year, the emphasis will be to increase the data acquisition speed of the instrument. Quicker collection of 4 pi steradian data sets is desirable. The capability to use Amber on aircraft will be a follow on requirement.